

GUIDELINES FOR THE DELINEATION OF 5-PERCENT AND 1-PERCENT PUBLIC USE MICRODATA AREAS (PUMAs)

The Census 2000 PUMA Program is a voluntary program offered to the state data centers (SDCs) by the U.S. Census Bureau. SDC participants have the opportunity to delineate, or to coordinate the delineation of, the Census 2000 5-percent PUMAs and 1-percent super-PUMAs.

The Census Bureau has prepared this document to assist participants with their delineation of 5-percent and 1-percent PUMAs. These guidelines will familiarize participants with the Census Bureau's PUMA criteria and assist participants in making geographic decisions as they delineate their PUMAs. **Section I** focuses on the Census Bureau's PUMA rules and recommendations for delineating PUMAs. It explains in detail what is and is not permitted, and what is recommended in various geographic situations. **Section II** presents a series of specific steps that participants should follow in developing and implementing the PUMA delineation plan for their state. **Section III** provides instructions for utilizing the geographic equivalency file provided by the Census Bureau to each participating SDC. **Participants must use this file for submitting their 5-percent PUMAs to the Census Bureau.** (Section II.C.3. contains separate instructions for submitting the 1-percent PUMAs.)

I. 5-Percent PUMA Criteria Requirements and Recommendations

The 5-percent PUMA criteria are a mixture of rules and recommendations; rules that must be adhered to in all situations, and recommendations for how PUMAs should be delineated in order to maximize the usefulness of the public use microdata samples data.

A. Rules

1. All area within a state must be contained within both a 5-percent PUMA and a 1-percent super-PUMA.
2. Each 5-percent PUMA must always contain at least 100,000 people.
3. Counties with fewer than 100,000 people **cannot** be in more than one PUMA. There is one exception to this rule that involves portions of incorporated places with a total population of 100,000 or more (see the note in Section I.B.3.).
4. PUMA boundaries can only follow the boundaries of the following geographic areas:
 - a. Counties and statistically equivalent entities;

- b. Minor civil divisions (MCDs), but only in the New England states;
- c. Census tracts, but **only** within counties that have more than 100,000 people, and
- d. Places with a **population of 100,000 or more people**.

The use of incorporated place boundaries as PUMA boundaries **is only permitted** when the PUMAs for these places **comprise only the area of these places**.

- 5. Each PUMA must constitute a geographically contiguous area.

There are four situations where an exception can be made to this rule:

- a. A PUMA or group of PUMAs that are defined to **comprise only the geographic area of an incorporated place** with a population greater than 100,000 are allowed to be discontinuous. These PUMAs are allowed to be discontinuous where there exist **enclaves** within the incorporated place or where the incorporated place has one or more areas that are **detached from the main body**.
- b. A PUMA may be discontinuous if a county is discontinuous.
- c. A PUMA may be discontinuous when it surrounds another whole PUMA, such as when a large non-MA PUMA surrounds a metropolitan area (MA)-based PUMA.
- d. A PUMA may be discontinuous when it surrounds a detached piece of an incorporated place PUMA or when part of it is an enclave within an incorporated place PUMA.

B. Recommendations

The Census Bureau **does not require** participants to adhere to the following recommendations, but we **strongly encourage** participants to do so. In many instances, it will be geographically impossible to adhere to some of these recommendations, and **in no instance will the Census Bureau approve a PUMA that breaks any of the rules listed above in order to meet a recommendation**.

1. Wherever possible, each PUMA should comprise an area that is either entirely inside or entirely outside MAs.
2. Wherever possible, a PUMA should not cross the boundaries of metropolitan statistical areas (MSAs), primary metropolitan statistical areas (PMSAs), or consolidated metropolitan statistical areas (CMSAs).
3. The Census Bureau recommends the delineation of one or more PUMAs to exclusively contain the entire area of incorporated places that have a population of 100,000 or more.

NOTE: An incorporated place PUMA may include the portion of the place that is contained within a county that does not have a population of at least 100,000. In these situations, the county can be part of two PUMAs: one PUMA that comprises the incorporated place and one PUMA that includes the remainder of the county.

4. The Census Bureau recommends that the number of 5-percent PUMAs be maximized, and that 5-percent PUMAs should not contain more than 200,000 people, wherever possible.
5. Wherever possible, the 5-percent PUMA boundaries should conform to the 1990 census 1-percent PUMA boundaries in order to provide data users with comparability.

II. PUMA Delineation Process

This section contains guidelines and additional recommendations for delineating PUMAs. The first part of this section provides guidelines for how to systematically approach the process of delineating 5-percent PUMAs. The second part provides recommendations for how to number these PUMAs. The third part provides rules and requirements for the delineation of the 1-percent super-PUMAs.

A. 5-Percent PUMA Delineation

1. Inventory of Geography

Each of the state-based 2000 PUMA geographic equivalency files that are furnished by the Census Bureau contain all of the geographic components that can be used for delineating PUMAs (see Section III). MA codes and Census 2000 population counts for each geographic entity are contained in the file. Use the file or other sources to do the following:

- a. Determine which counties (MCDs in New England) are MA counties and how they are currently organized into MSAs, PMSAs, and CMSAs.
 - b. Determine the population for each county.
 - c. Determine which incorporated places contain 100,000 or more people and in what counties they exist.
2. Tentative Allocation of PUMAs

Begin the delineation of PUMAs within the state by listing all MAs and their total population and all incorporated places with over 100,000 people. Estimate the maximum number of potential PUMAs each could contain.

The following is a list of hypothetical MAs that are used as examples throughout the document:

MSA/CMSA Name	MSA/CMSA Population	Population of Places >100,000	Number of Potential PUMAs
Able MSA	130,000		1
Baker MSA	148,000		1
Charlie MSA	98,000		1 (part)
Delta MSA	308,000		3
Eagle-Echo CMSA	1,862,000	333,000	18
Fox MSA	1,062,000	437,000	10
Golf MSA (part)	77,000		1 (part)

3. Steps to Follow in Delineating 5-Percent PUMAs

Every state has its own unique set of geography and situations that influence the process of delineating the PUMAs. The following is a recommended sequence of steps for doing the basic delineation of PUMAs. These steps incorporate most situations that involve the population size of county/place and MA status.

NOTE: Research the 1990 census 1-percent PUMAs to see how complex situations were taken care of for this census. **CAUTION:** The 1990 1-percent file cannot always be relied on for guidance, because the 1990 criteria allowed 1-percent PUMAs to extend across state boundaries; this is **not permitted** for Census 2000.

The following six delineation steps proceed from simpler geographic situations to more complex ones:

a. MAs That Are Single PUMAs (100,000 to 199,999)

MAs that have 100,000 to 199,999 people qualify as single PUMAs on the basis of their population size (regardless of how many counties or MCDs comprise the MA). The **Able** (130,000) and **Baker** (148,000) MSAs are in this category.

For our example, both MAs are freestanding entities surrounded by non-MA counties.

b. MAs That Have Fewer Than 100,000 People

MAs with fewer than 100,000 people, such as the **Charlie** MSA in the example, that do not meet the minimum population size requirement for a PUMA, must be combined with adjacent areas.

The following are the two most common ways to delineate PUMAs for MAs with less than 100,000 people:

- 1) Where these MAs are freestanding entities surrounded entirely by non-MA counties, combine one or more adjacent non-MA counties with the MA in order to meet the minimum population requirement.
- 2) Where these small MAs are adjacent to both non-MA counties and MA counties that are in one or more other MAs, the Census Bureau recommends the following preference priority:
 - a) If there is an adjacent small MA (less than 100,000 people), combine the two small MAs into one PUMA.
 - b) If there is no adjacent small MA, then combine the small MA with adjacent non-MA territory.
 - c) If the above two options are unavailable, then combine the small MA with area of the least populous adjacent MA.

c. MSA/PMSA State Crossover Parts (Less Than 100,000 People)

MAs with fewer than 100,000 people may be part of larger MSAs/PMSAs that are located primarily in adjoining states. The **Golf** MSA is an example of a “state crossover part” MA.

Use the same procedures shown above for MAs with less than 100,000 people to delineate PUMAs that contain these small MA parts.

d. MAs That Contain Multiple PUMAs

Multiple PUMAs can be delineated for those MAs that contain a population greater than 200,000 people. There are three basic PUMA delineation situations that occur within these large MAs.

1) Single Large County, No Large Place

For large single-county MAs without a place that has a population greater than 100,000, PUMAs are delineated by clustering adjacent census tracts. The **Delta** MSA (308,000) is an example of an MA of this type where two or three PUMAs may be delineated.

2) Large Multiple-County MA

MAs with multiple counties usually contain one or more counties with less than 100,000 people. Those counties with less than 100,000 people cannot comprise an entire PUMA nor can they be split between two or more PUMAs [see Section II.A.3.d.3) for an exception]. Their entire area must be combined with other area within the MA.

Fox MSA
Components

	<u>Co. Pop.</u>	<u>Large Place's Pop. by Co.</u>
County 1	654,000	331,000
County 2	180,000	103,000
County 3	71,000	12,000
County 4	83,000	2,000
County 5	19,000	
County 6	32,000	
County 7	23,000	

In the above example, Fox MSA Counties 3-7 could be combined to form two PUMAs, such as Counties 3, 5, and 6 as one PUMA and Counties 4 and 7 as the other PUMA, or some of the counties could be combined to form a PUMA and the remaining counties combined with parts of Counties 1 or 2 to be part of other PUMAs.

3) Large Multiple-County MA With a **Place** PUMA

The Fox MSA also provides examples for the delineation of PUMAs that comprise the area of a place with 100,000 or more people. PUMAs delineated for this purpose **MUST COMPRISE ONLY THE AREA OF THE PLACE**. Delineate the incorporated place PUMAs first, and then complete the PUMA delineation for the remainder of the MSA.

As shown above, there is a large place within the Fox MSA that has a total population of 448,000 and it is located in Counties 1-4. Each county provides an example for delineating PUMAs for large places.

a) Small Piece in Adjacent Small County

PUMAs for large places can contain area that is in more than one county, including those counties that have less than 100,000 people. Using the Fox MSA as an example, Counties 3 and 4 represent situations where a small county contains a small part of a large place.

The portions of the place that are in Counties 3 and 4 can either be parts of place-based PUMAs in County 1 and/or County 2, or can be combined with the remainder of their counties in PUMAs that are not place-based.

b) Single Place-Based PUMA

County 2 is an example of a county that can have a place-based PUMA only under certain circumstances due to the total population of the county. Because the population of the county is 180,000, the non place portion contains only 77,000 people, which is not large enough to be a PUMA without adding people from another county.

The Census Bureau recommends only the following two options for PUMA delineation for counties like County 2:

- 1] One PUMA for the entire county, or
- 2] A place-based PUMA and a non place-based PUMA that includes non place area from another county within the same MSA or PMSA. The Census Bureau does not recommend that the non place area be combined with a PUMA from a different MSA or PMSA, or with a PUMA that contains non-MA area.

c) Multiple Place-Based PUMAs

County 1 has a large place population of 331,000 and a remainder of county population of 323,000. Counties such as County 1 can have place-based PUMAs and non place-based PUMAs. In addition, these PUMAs can nest within the county or can extend beyond the county, especially when the large place extends into surrounding counties.

e. Non-MA Counties/MCDs

PUMAs in non-MA areas will consist of groupings of contiguous counties (in New England, contiguous MCDs). Each grouping must have at least 100,000 people. The basis for establishing these groupings may be economic orientation, predominant land use, or some regional breakdown that results in a set of areas meaningful to the data users.

NOTE: Non-MA counties/MCDs (less than 100,000 people) that are isolated due to being surrounded by MA counties/MCDs must be part of a PUMA that includes the area of adjacent MA counties/MCDs.

B. Numbering the 5-Percent PUMAs

The Census Bureau has developed specific guidelines for numbering the 5-percent PUMAs. These guidelines are designed to **uniquely identify each PUMA within a state** and also to **relate groups of PUMAs that comprise a county or large incorporated place**.

<u>Geographic Area of PUMA(s)</u> <u>COUNTY NAME/Place Name</u>	<u># of PUMAs</u>	<u>PUMA Code(s)</u>
WASHINGTON	1	00500
GREEN, FOX, WOOD	1	00600
JEFFERSON	3	00401-00403
CLINTON (part)	5	00101-00105
CLINTON/Springfield (part)	12	00201-00212
BUTLER (part), HOUSTON	1	00300
BUTLER/Springfield (part)	1	00213

The following are basic guidelines for assigning codes to 5-percent PUMAs.

1. Each PUMA code must consist of a 5-digit numeric code that is unique within the state.
2. A group of PUMAs that **nest within a county or within an incorporated place** must be identified with codes that **contain the same first three digits**. This is required so that data users can easily determine that groups of PUMAs comprise a county, a place, or the remainder of a county where place PUMAs are defined.

JEFFERSON is an example of three PUMAs (00401, 00402, and 00403) that nest within a county and share “004” as their first three digits.

CLINTON/Springfield (part) is an example of 12 PUMAs (00201-00212) that comprise the area of Springfield city within Clinton County.

BUTLER/Springfield (part) is an example of a PUMA that comprises the portion of Springfield city that is in Butler County. Note that its PUMA code 00213 identifies it as one of the 13 PUMAs that comprise the city of Springfield.

CLINTON (part) represents the remainder of Clinton County outside of Springfield city and contains five PUMAs numbered 00101-00105.

3. For each PUMA that consists of either **an entire county or a group of counties**, assign a PUMA code that has “00” for the fourth and fifth characters of the PUMA code. There is no need to use the last two digits because these PUMAs cannot be grouped to form a single county, a large incorporated place, or the remainder of a county where place-based PUMAs are defined.

WASHINGTON, 00500, is a county with a single PUMA.

GREEN, FOX, WOOD, 00600, is an example of a multiple-county PUMA.

BUTLER (part), HOUSTON is an example of a PUMA that consists of a remainder (part) of a county and another county.

4. Assign the PUMA codes sequentially, beginning with 00100, 00200, 00300, and so forth. Use a geographic sequence, beginning with the PUMA located in the northwest corner of the state. Then proceed from west to east, then east to west, in a serpentine fashion, until every PUMA has been assigned a 5-digit numeric code. The numbering sequence should identify all PUMAs as they occur geographically, whether MA-based PUMAs or non-MA PUMAs.

C. 1-Percent Super-PUMAs

1. Delineating 1-Percent PUMAs
 - a. Each 1-percent PUMA must contain a minimum of 400,000 people.
 - b. The rules, recommendations, and guidelines for delineating super-PUMAs are almost identical to those for 5-percent PUMAs. The only differences between the two are those that are based on population size (see Sections I and II).

NOTE: Because 1-percent PUMAs are much larger than 5-percent PUMAs, 1-percent PUMAs will not meet Census Bureau recommendations as frequently as the 5-percent PUMAs.
 - c. **Each 1-percent PUMA must consist of one or more adjacent 5-percent PUMAs. There are no exceptions.**
2. Numbering the 1-Percent PUMAs

The numbering procedures for 1-percent PUMAs are slightly different from 5-percent PUMAs because the numbers for 1-percent PUMAs must be unique within the nation, not just within each state.

- a. Each 1-percent PUMA code will consist of a 5-digit numeric code that is unique within the state.
- b. All 1-percent PUMAs codes within a state must contain the state federal information processing standard (FIPS) code for the first two digits of the PUMA code. For example, the FIPS code for Arizona is 04, so all 1-percent PUMA codes in Arizona will begin with 04.
- c. Use the remaining three digits of the 1-percent PUMA code to **uniquely identify each super-PUMA within a state** and also to **relate groups of super-PUMAs that comprise a county or large incorporated place**.
 - 1) A group of 1-percent PUMAs that **nest within a county or within an incorporated place** must be identified with codes that **contain the same third and fourth digits**. This enables data users to easily determine that groups of 1-percent PUMAs comprise a county, a place, or the remainder of a county where place-based PUMAs are defined
 - 2) For each 1-percent PUMA that either **comprises an entire county or a group of counties**, assign a 1-percent PUMA code that has “0” for the last digit of the PUMA code. There is no need to use the last digit because these PUMAs cannot be grouped to form a single county, a large incorporated place, or the remainder of a county where incorporated place PUMAs are defined.
 - 3) Assign 1-percent PUMA codes sequentially in a geographic sequence, beginning with the 1-percent PUMA located in the northwest corner of the state. Then proceed from west to east, then east to west, in a serpentine fashion, until all PUMAs have been assigned a 5-digit numeric code. The numbering sequence identifies all 1-percent PUMAs as they occur geographically, whether MA-based PUMAs or non-MA PUMAs.

3. 1-Percent/5-Percent PUMA Equivalency File

In order to submit the 1-percent PUMA information, the Census Bureau requests that the SDC participants create a file that lists all 1-percent PUMAs within their state and the 5-percent PUMAs that nest within each of the 1-percent PUMAs.

If prepared correctly, this file will contain all 5-percent PUMAs within the state and each will be listed only once.

III. 5-Percent PUMA Geographic Equivalency File

The Census Bureau has developed dual-purpose state-based geographic equivalency files that the SDC participants may use in the delineation of their PUMAs and **must use for submitting their 5-percent PUMAs to the Census Bureau.** These files contain the set of geographic components (counties, places, census tracts), based upon the criteria, that participants **must use** for delineating PUMAs. In addition, the files contain a field for entering the 5-percent PUMA codes. The Census Bureau will e-mail two versions of the appropriate state-based file to each SDC participant. One version is an ASCII comma-delimited text version that can be converted easily into other file types, and the other version has been converted into an Excel file.

A. Content of the PUMA Geographic Equivalency File Fields

The following is a description of the fields contained in the PUMA geographic equivalency file:

1. Record Type

This field indicates whether the record is for a county (C), a minor civil division (M), a place (P), or a census tract (T).

a. County Records

All counties will have one county record.

b. MCD Records

The files will contain one record for each MCD and statistically equivalent entity in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

c. Place Records

For those places that contain 100,000 or more people, the file will contain **a separate record for each county where the place exists**, regardless of the population size of the county or the population of the piece of the place within each county.

d. Census Tract Records

Census tract records will **appear only for counties that have 100,000 or more people** and in the MCD/city of Boston (no other MCDs/places in New England will contain census tract records because these areas cannot be split).

The file will contain a record for all census tracts in counties with 100,000 or more people. More than one census tract record will exist for those census tracts that are partially within a place that has a population of 100,000 or more--one record for the part that is inside the place and one record for the part that is outside the place.

2. State FIPS Code

This field contains the 2-digit FIPS state code.

3. County FIPS Code

This field contains the 3-digit FIPS county code.

4. MCD/Place FIPS code

This field contains either the FIPS code for an MCD (New England states) or the FIPS code for a place that has a population greater than 100,000 (outside of New England states). The field will contain a FIPS code for all M and P records and for those T records representing a census tract that is entirely or partially within a place with a population greater than 100,000 (the census tract records for Boston, Massachusetts, will contain an MCD FIPS code).

5. Census Tract Code

This field contains the Census 2000 census tract code for all T records. **NOTE: Census tracts may be listed more than once if**

they are partially within a place with a population of 100,000 or more people; once for the portion within the place and once for the portion outside of the place.

6. Part Indicator

This field will contain a P for those place records for a place that is in more than one county. This field will also contain a P for those census tract records for a census tract that has a part within a listed place and a part outside of that place.

7. MA Code

This field contains the June 30, 1999, PMSA and MSA codes for those geographic entities that are within a PMSA or MSA. This information is included to assist participants with the delineation of PUMAs within MAs.

8. 5-Percent PUMA Code

This is the field for the SDC participants to enter the 5-digit codes for their 5-percent PUMAs.

9. Census 2000 Population

This field contains the Census 2000 population for each record. The SDC participant can use this field to calculate the population of each proposed PUMA.

10. Name

This field contains a name for each county, MCD, and place record.

B. PUMA Geographic Equivalency File Content Examples

The following are examples of the geographic content of the equivalency files:

1. County Less Than 100,000 With No Portion of a Place Greater Than 100,000

C,01,001,,,,,,34222,Autauga County

This is the only record for the county.

2. County Less Than 100,000 With a Portion of a Place Greater Than 100,000

C,01,117,,,,,99358,Shelby County
 P,01,117,07000,,P,,,770,Birmingham city
 P,01,117,,,P,,,98588,Remainder of County

These three records are the only records required for the county.

NOTE: The place records have part flags.

3. County Greater Than 100,000 With No Portion of a Place Greater Than 100,000

C,01,097,,,,,378643,Mobile County
 T,01,097,,000100,,,,4358,
 T,01,097,,000201,,,,3611,
 T,01,097,,000202,,,,5022,

This shows that the records for this type of county will consist of one county record and one record for each census tract.

4. County Greater Than 100,000 With a Portion of a Place Greater Than 100,000

C,01,073,,,,,651525,Jefferson County
 P,01,073,07000,,P,,,264890,Birmingham city
 T,01,073,07000,800101,P,,,2787,
 T,01,073,07000,800102,,,,3410,
 T,01,073,,800101,P,,,1358,
 T,01,073,,801400,,,,4358,

This example illustrates the need for more than one record for the same census tract (800101) when the census tract is partially inside and outside of a listed place. **NOTE:** Both the place and the census tract records can have a part flag.

5. New England County

C,23,009,,,,,46948,Hancock County
 M,23,009,01185,,,,,226,Amherst town
 M,23,009,23200,,,,,5975,Elsworth city

C. Using the PUMA Geographic Equivalency File

1. Entering the 5-Percent PUMA Codes

- a. Enter all five digits of the 5-percent PUMA code including zeros.
- b. Assign 5-percent PUMAs to all geographic area within the state.
- c. Assigning 5-Percent PUMA Codes to Record Types

There is no need to enter 5-percent PUMA codes into all records. These files contain the following geographic hierarchies: county/place/census tract, county/census tract, and county/MCD/census tract. A PUMA code entered into a county record assigns the entire area of the county to that PUMA. A

5-percent PUMA code entered into a place record assigns the entire area of the place (within the county) to that PUMA.

- 1) Only enter 5-percent PUMA code into the PUMA field of a county record when the entire county is being assigned to one 5-percent PUMA.
- 2) Only enter the 5-percent PUMA code into the PUMA field of a place record when the entire place within that county is being assigned to one 5-percent PUMA.
- 3) Enter the 5-percent PUMA code into census tract records only when either the county or place is being divided into more than one 5-percent PUMA.

NOTE: Because the file can contain more than one record for a census tract (partially inside and outside an incorporated place with a population greater than

100,000), all relevant parts must contain 5-percent PUMA codes.

2. Checking PUMA Entries

Perform the following activities to verify that the 5-percent PUMAs meet the criteria:

a. 5-Percent PUMA Geography Check

Sort the file by 5-percent PUMA code, and within PUMA, by county, then place, then census tract. Check the geographic components of each 5-percent PUMA to ensure that:

- 1) All area within the state is assigned to 5-percent PUMAs. Check the records without a PUMA code to find areas that should have a PUMA code.
- 2) Check to ensure that 5-percent PUMA codes do not appear more than once for the same geographic area. For example, if a county record contains a 5-percent PUMA code, no place, MCD, or census tract records for that county can have a 5-percent PUMA code.
- 3) Check the PUMA codes to make sure that there are no incorrectly entered codes, such as those that leave gaps in the range of 5-percent PUMA codes or do not meet the 5-percent PUMA numbering criteria.

b. PUMA Population Check

After checking the geography of each PUMA and making corrections to the file, check the population of each PUMA. If the file is in Excel, sort by PUMA and sum the population field for each record that contains the PUMA code.

NOTE: The sum of all 5-percent PUMAs must equal the population for the state; if a county or place is subdivided into multiple 5-percent PUMAs, the population totals for those PUMAs must equal the population of the county or place.

D. Transmitting PUMAs to the Census Bureau

1. Submit the entire Census Bureau provided geographic equivalency file. Do not delete those geographic components that have no PUMA codes.
2. Send the geographic equivalency file back in either of the original formats: Excel or ASCII comma-delimited text.
3. Send the 1-percent/5-percent PUMA equivalency information as either a text file or as text in the body of an e-mail message.
4. Send the file(s) as an e-mail attachment to:
puma@geo.census.gov.

Please direct questions and comments to David Aultman or James Davis. Their telephone number is (301) 457-1099; their e-mail addresses are: daultman@geo.census.gov or jdavis@geo.census.gov.